

 <p>FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE</p> <p>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</p> <p>JUN 25 2004</p> <p>(USE SEPARATE SHEETS IF NECESSARY)</p>	ATTY. DOCKET NO. ASMMC.057AUS	APPLICATION NO. 10/810,415
	APPLICANT Leinikka et al..	
	FILING DATE March 25, 2004	GROUP 2812 2814

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE (IF APPROPRIATE)
AC	3,708,728	1/2/73	Sterling et al.			
	4,058,430	11/15/77	Suntola et al.			
	4,565,747	1/21/86	Nakae et al.			
	4,935,661	6/19/90	Heinecke et al.			
	5,281,274	01/25/94	Yoder			
	5,306,666	4/26/94	Izumi			
	5,316,793	05/94	Wallace			
	5,342,652	08/30/94	Foster et al.			
	5,382,333	1/17/95	Ando et al.			
	5,438,028	8/1/95	Weissman et al.			
	5,595,784	1/21/97	Kaim et al.			
	5,603,771	2/18/97	Seiberras et al.			
	5,691,235	11/25/97	Meikle et al.			
	5,711,811	01/27/98	Suntola et al.			
	5,723,384	03/03/98	Park et al.			
	5,744,254	4/28/98	Kampe et al.			
	5,789,024	8/4/98	Levy et al.			
	5,915,004	6/22/99	Pabbati et al.			
	5,916,365	06/29/99	Sherman			
	5,946,598	8/31/99	Yeh			
	5,964,943	10/12/99	Stein et al.			
	5,972,430	10/26/99	DiMeo, Jr. Et al.			
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	6,015,590	1/18/00	Suntola et al.			
	6,087,257	7/11/00	Park et al.			
	6,099,904	8/8/00	Mak et al.			
	6,156,382	12/5/00	Rajagopalan et al.			
AC	6,162,501	12/19/00	Kim			

EXAMINER	<i>Alfonso Chambless</i>	DATE CONSIDERED	11/28/05
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AC	29.	6,203,613	3/20/01	Gates et al.			
	30.	6,206,967	3/27/01	Mak et al.			
	31.	6,284,646	9/4/01	Leem			
	32.	6,287,965	09/11/01	Kang et al.			
	33.	6,342,277 B1	1/29/02	Sherman			
	34.	6,355,561	3/12/02	Sandhu et al.			
	35.	6,380,627	4/30/02	Weihs et al.			
	36.	6,416,577	7/9/02	Suntola et al.			
	37.	6,482,733	11/19/02	Raaijmakers et al.			
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	39.	6,534,395	3/18/03	Werkhoven et al.			
	40.	6,576,053	6/10/03	Kim et al.			
	41.	6,616,982	9/9/03	Merrill et al.			
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	43.	US 2003/0032281	2/13/03	Werkhoven et al.			
	44.	US 2003/0049931 A1	3/13/03	Byun et al.			
	45.	US 2003/0104126 A1	6/5/03	Fang et al.			
	46.	US 2003/0123216 A1	7/3/03	Yoon et al.			
	47.	US 2003/0127043 A1	7/10/03	Lu et al.			
	48.	US 2003/0153181 A1	8/14/03	Yoon et al.			
	49.	US 2003/0157760 A1	8/21/03	Xi et al.			
	50.	US 2003/0161952 A1	8/28/03	Wang et al.			
	51.	US 2003/0165615	9/4/03	Aaltonen et al.			
	52.	US 2003/0181035 A1	9/25/03	Yoon et al.			
	53.	US 2003/0194825 A1	10/16/03	Law et al.			
AC	54.	US 2003/0203616 A1	10/30/03	Chung et al.			

EXAMINER	<i>Alvin O. Chemulais</i>	DATE CONSIDERED	<i>11/28/05</i>
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FOREIGN PATENT DOCUMENTS							
EXAMINER INITIAL		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION
							YES NO
AC	55.	EP 0 387 403 A1	10/20/89	EPO			
	56.	EP 0 394 054 A1	4/20/90	EPO			
	57.	EP 0 442 490 A1	08/21/91	EPO			
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	59.	EP 0 774 533 A1	10/24/96	EPO			
	60.	EP 0 899 779 A2	03/03/99	EPO			
	61.	EP 1 167 567 A1	02/01/02	EPO			
	62.	JP 6037041	2/10/94	Japan			
	63.	JP 6069157	3/11/94	Japan			
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	65.	JP 8 264 530 A	10/11/96	Japan Abstract			
	66.	WO 96/18756	6/20/96	PCT			
	67.	WO 98/51838	11/19/98	PCT			
	68.	WO 00/01006	01/06/00	PCT			
	69.	WO 00/47404	2/11/00	PCT			
	70.	WO 00/47796	08/17/00	PCT			
	71.	WO 00/54320	9/14/00	PCT			
	72.	WO 01/27347	4/19/01	PCT			
	73.	WO 01/29280	4/26/01	PCT			
	74.	WO 01/29891	4/26/01	PCT			
	75.	WO 01/29893	4/26/01	PCT			
	76.	WO 01/53565	1/22/01	PCT			
	77.	WO 01/66832 A2	9/13/01	PCT			
	78.	WO 01/78123	10/18/01	PCT			
	79.	WO 01/88972	11/22/01	PCT			
	80.	WO 96/17107	6/6/96	PCT			
AC	81.	WO 96/18756	06/20/96	PCT			

EXAMINER	<i>Alempio Chambilia</i>	DATE CONSIDERED	11/28/05
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82.	WO 98/51838	11/19/98	PCT				
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EXAMINER INITIAL	OTHER DOCUMENTS (INCLUDING AUTHOR, TITLE, DATE, PERTINENT PAGES, ETC.)	
AC	83.	"Kirk-Othmer Encyclopedia of Chemical Technology," 4 th Edition, Vol. 4, John Wiley & Sons, Inc. pp. 841-878, (1992).
	84.	Andriacacos et al., "Damascene copper electroplating for chip," <u>IBM Jour. Research and Dev.</u> , 42:567 (1998).
	85.	Bain et al., "Deposition of tungsten by plasma enhanced chemical vapour deposition," <u>J. Phys. IV France</u> , Vol. 9, pp. 827-833 (1999)
	86.	Elers et al., "NbC15 as a precursor in atomic layer epitaxy," <u>Applied Surface Science</u> , 82/83:468-474 (1994).
	87.	Girolami, Gregory S., James A. Jensen, John E. Gozum, and Deborah M. Pollina, "Tailored Organometallics as Low-Temperature CVD Precursors to Thin Films," <u>Materials Research Society Symposium Proceedings</u> , Vol. 121, pp. 429-438, (1988).
	88.	Helmut Tulhoff, Hermann C. Starck, and Werk Goslar, "Ullmann's Encyclopedia of Industrial Chemistry," 5th, Completely Revised Edition, Vol. A5, pp. 61-77, (1986).
	89.	Hermann Jahn, Gudrun Bär, Erich Best, and Ernst Koch, "Gmelin Handbook of Inorganic and Organometallic Chemistry," 8 th Edition, Vol. A 5b, No. 54, pp. 131-154, (1993).
	90.	Hiltunen et al., "Nitrides of titanium, niobium, tantalum and molybdenum grown as thin films by the atomic layer epitaxy method," <u>Thin Solid Films</u> , 166:149-154 (1988).
	91.	Jeon, H., "A Study on the Characteristics of TiN Thin Film Deposited by Atomic Layer Chemical Vapor Deposition Method," <u>AVS 46th International Symposium</u> , Seattle, WA, abstract TF-MoP17 (1999)
	92.	Jeon, H., et al., "A Study on the Characteristics of TiN Thin Film Deposited by Atomic Layer Chemical Vapor Deposition Method," <u>J. Vac. Sci. Technol. A</u> , 18(4), 1595-1598 (2000)
	93.	Juppo et al., "Deposition of copper films by an alternate supply of CuCl and Zn," <u>J. Vac. Sci. Technol A</u> , Vol. 15, No. 4, pp. 2330-2333, (July/August 1997).
	94.	Klaus et al., "Atomic Layer Deposition of Tungsten Nitride Films Using Sequential Surface Reactions," <u>Journal of the Electrochemical Society</u> , Vol. 147, No. 3, pp. 1175-1181, (2000).
	95.	Klaus et al., "Atomic layer deposition of tungsten using sequential surface chemistry with a sacrificial stripping reaction," <u>Thin Solid Films</u> , Vol. 360, pp. 145-153, (2000).
	96.	Klaus, J.W., et al., "Atomic layer deposition of tungsten and tungsten nitride using sequential surface reactions," <u>AVS 46th International Symposium</u> , Seattle, WA, abstract TF-TuM6 (1999)
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	99.	Leskelä et al., "ALD precursor chemistry: Evolution and future challenges," <u>Jour. Phys. IV France</u> 9, pp. 837-852 (1999).
AC	100.	Ludviksson et al., "Low-Temperature Thermal CVD of Ti-Al Metal Films Using a Strong Reducing Agent," <u>Chem. Vap. Deposition</u> , Vol. 4, No. 4, pp. 129-132, (1998)

EXAMINER	<i>Henry Chanillo</i>	DATE CONSIDERED	11/28/04
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AC	101.	Martensson et al., "Atomic Layer Epitaxy of Copper and Tantalum," <u>Chemical Vapor Deposition</u> , Vol. 3, No. 1, pp. 45-50, (1997)	
	102.	Martensson et al., "CU(THD) ₂ As Copper Source in Atomic Layer Epitaxy," <u>Electrochemical Society Proceedings</u> , Vol. 97-25, pp. 1529-1536	
	103.	Martensson, "Use of atomic layer epitaxy for fabrication of Si/TiN/Cu structures," <u>J. Vac. Sci. Technol. B</u> , Vol. 17, No. 5, pp. 2122-2128, (Sept./Oct. 1999)	
	104.	Min, Jae-Sik , Young Woong Son, Won-Gu Kang, Soung-Soon Chun, and Sang-Won Kang, "Atomic Layer Deposition of TiN Films by Alternate Supply of Tetrakis (ethylmethylamino)-Titanium and Ammonia," <u>Jpn. J. Appl. Phys.</u> , Vol. 37, pp. 4999-5004, (1998).	
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	110.	Ritala et al., "Effects of intermediate zinc pulses on properties of TiN and NbN films deposited by atomic layer epitaxy," <u>Appl. Surf. Sci.</u> , 120:199-212 (1997).	
	111.	Ritala et al., "Perfectly conformal TiN and Al ₂ O ₃ films deposited by atomic layer deposition," <u>Chem. Vapor Deposition</u> , 5:7-9 (1999).	
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	113.	Sherman et al., "Plasma enhanced atomic layer deposition of Ta for diffusion barrier applications," AVS 46 th International Symposium, Paper TF-TuM5 (abstract), (October 26, 1999), Seattle, WA.	
AC	114.	Yang et al., "Atomic Layer Deposition of Tungsten Film from WF ₆ /B ₂ H ₆ : Nucleation Layer for Advanced Semiconductor Devices," Advanced Metallization Conference 2001 (AMC 2001), Conference Proceedings ULSI XVII@2002 Materials Research Society, pp. 655-660.	

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EXAMINER	Adriano Chambless	DATE CONSIDERED	11/28/05
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